REMARKS

The above-identified application has been carefully reviewed in light of the Office Action mailed November 4, 2009.

Without conceding the correctness of the Examiner's rejections, applicant has amended the present claims to facilitate prosecution and obtain an early allowance in the above-identified application. Applicant expressly reserves the right to seek patent protection for the original claims and for any other claims supported by the above-identified application in one or more related applications.

Specifically, claim 23 has been amended to read consistently with independent claim 22. Claim 25 has been amended to read more consistently. In addition, claims 20 and 21 have been canceled, without prejudice. The claim amendments do not introduce any new matter.

Claims 1-12, 14, 15, and 17-27 have been rejected under 35 U.S.C. 102(b) as being unpatentable over (anticipated by) Salokatve et al. Claims 13 and 16 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Salokatve et al. Applicant traverses each of these rejections as it pertains to claims 1-19 and 22-27.

The present claims are directed to optical devices comprising an active semiconductor region; a signal-light reflector; and a pump-light reflector. The active semiconductor region is configured to provide gain to signal light passing through the active region. The signal-light reflector is arranged to reflect the signal light through the active region in a direction out of the plane of the active region.

In independent claim 1, the pump-light reflector is arranged to reflect pump light so as to form a pump standing

wave in the device. The optical device of claim 1 further comprises an absorber configured to absorb light at a wave length of the signal light and located at a position in the device in which there is no or substantially no pump light.

In independent claim 22, the pump-light reflector is arranged between the signal-light reflector and the active region.

In independent claim 25, the pump-light reflector is arranged to reflect pump light so as to form a pump standing wave in the device; and the device further comprises an element, arranged in the pump standing wave, effective to absorb pump light to provide gain to the signal light, the element being arranged at or near to an antinode of the pump standing wave.

A person of ordinary skill in the art understands that, in semiconductor laser action, pump light is light that is absorbed to provide excited carriers in the active region, and signal light is light generated in the active region as a result of recombination of the excited carriers.

Salokatve et al discloses an optically-pumped semiconductor, vertical-cavity, surface-emitting laser including a first mirror having a quantum-well structure thereon which provides a gain medium for the laser. Salokatve et al discloses that the laser includes a second mirror spaced-apart from the quantum-well structure and, together with the first mirror, forms a resonant cavity for light generated in the laser (i.e. signal light).

Salokatve et al, at column 6, lines 13-29 discloses as follows:

> Quantum-well structure 16 can be described functionally as including a plurality of quantum-well

layers having pump-radiation-absorbing layers between successive ones thereof. The number of quantum-wells is not limited to the fifteen exemplified above or any other number. Preferably, however, at least ten should be included.

Those skilled in the art to which the present invention pertains will recognize that pump-radiation absorbed in layers 50 generates electrical carriers which "fall" into quantum-well layers 48, creating a massive concentration of these electrical carriers in the quantum-well layers. Carrier recombination in the quantum-well layers generates the laser-radiation. The arrangement of quantum-well structure 16 described above provides that quantum-well layers 44 thereof are located about at antinode position of an optical standing-wave which exists in cavity 24 when laser action is current.

Thus, Salokatve et al discloses that the pump light is absorbed in layers 50 and that the signal light is generated in quantum-well layers 48.

Salokatve et al does not disclose, teach or suggest the present claims. For example, Salokatve et al does not disclose, teach or even suggest an absorber configured to absorb light at a wavelength of the signal light, let alone such an absorber located at a position in the device at which there is no or substantially no pump light, as recited in independent claim 1.

The Examiner refers to column 7, lines 5-25 of Salokatve et al. This passage of Salokatve et al discloses positioning each quantum-well layer at the antinode of a standing-wave generated in the structure when the laser 10 is operational, i.e., at an

antinode of the signal light. This disclosure does not disclose, teach or even suggest an absorber configured to absorb light at a wavelength of the signal light, let alone such absorber located at a position in the device at which there is no or substantially no pump light, as recited in independent claim 1.

In view of the above, applicant submits that independent claim 1 is not anticipated by and is unobvious from and patentable over Salokatve et al under 35 U.S.C. 102(b) and 103(a).

In addition, Salokatve et al does not disclose, teach or even suggest an optical device including a pump-light reflector arranged between a signal-light reflector and an active region, as recited in independent claim 22.

Mirror 14 of Salokatve et al operates at the signal wavelength, that is 976 nm. Salokatve et al does not disclose, teach or even suggest that mirror 14 is an effective reflector at the pump wavelength, that is 808 nm. Indeed, one of ordinary skill in the art would expect that mirror 14 is not an effective reflector at the pump wavelength since such mirrors of the structure described between column 6, line 48 and column 7, line 4 of Salokatve et al are generally reflective only over a narrow wavelength band.

Moreover, Salokatve et al discloses, at column 4, lines 43-49, that pump radiation is not directed through mirror 22. At column 4, lines 47-49 of Salokatve et al, reference is made to possible parasitic reflections if the pump light were to be passed through the mirror 22, but a person of ordinary skill in the art would not consider that to be a disclosure of mirror 22 being a pump-light reflector in the sense in which the phrase is used in the claims of the above-identified application.

Not withstanding that, mirror 22 of Salokatve et al is not arranged between a signal-light reflector and an active region. This is in direct contrast to present claim 22 which includes, in part, a pump-light reflector arranged between the signal light reflector and the active region. See, for example, Figure 5b and Figure 12 of the above-identified application where pump-light reflector 127 is arranged between signal-light reflector 122 and active region 130.

In view of the above, applicant submits that independent claim 22 is not anticipated by and unobvious from and patentable over Salokatve et al under 35 U.S.C. 102(b) and 103(a).

Further, Salokatve et al does not disclose, teach or even suggest a pump-light reflector arranged to reflect pump light so as to form a pump standing wave, as recited in independent claim 25. In fact, there is no pump standing wave in the device described in Salokatve et al.

Thus, Salokatve et al does not disclose, teach or even suggest an optical device including an element arranged in a pump standing wave, effective to absorb pump light to provide gain to the signal light, with the element being arranged at or near to an antinode of the pump standing wave, as recited in independent claim 25.

In view of the above, applicant submits that independent claim 25 is not anticipated by and is unobvious from and patentable over Salokatve et al under 25 U.C.S. 102(b) and 103(a).

Applicant submits that the dependent claims are novel and are unobvious from and patentable over the prior art, Salokatve et al, at least by reason of their being dependent upon novel, unobvious and patentable independent claims, as discussed above. In particular, applicant submits, for example, for the reasons

set forth herein, that claims 13 and 16 are unobvious from and patentable over Salokatve et al under 35 U.S.C. 103(a).

In addition, each of the present dependent claims are separately patentable over the prior art. For example, the prior art does not disclose, teach or even suggest the optical devices recited in the present claims including the additional feature or features recited in the present dependent claims. Therefore, applicant submits that each of the present claims is separately patentable over the prior art.

In conclusion, applicant has shown that the present claims, that is claims 1-19 and 22-27 are not anticipated by and are unobvious from and patentable over the prior art under 35 U.S.C. 102(b) and 103(a). Therefore, applicant submits that the present claims are allowable and respectfully requests the Examiner to pass the above-identified application to issuance at an early date. Should any matters remain unresolved, the Examiner is requested to call applicant's attorney at the telephone number given below.

Respectfully submitted,

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